



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/963,487	09/27/2001	Steve Rochon	86177-15	8843
28291	7590	05/17/2006	EXAMINER	
FETHERSTONHAUGH - SMART & BIGGAR 1000 DE LA GAUCHETIERE WEST SUITE 3300 MONTREAL, QC H3B 4W5 CANADA			GREY, CHRISTOPHER P	
			ART UNIT	PAPER NUMBER
			2616	

DATE MAILED: 05/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/963,487

Applicant(s)

ROCHON ET AL.

Examiner

Christopher P. Grey

Art Unit

2616

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 25-37, 40-51, 53-55, 57 and 58 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 September 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date. _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

1. Claim 46-49, 51, and 57 are rejected under 35 U.S.C. 102(a) as being anticipated by Lyon (CA 2292828)

Claim 46 Lyon discloses a method for traffic flow control, where information is obtained pertaining to the congestion level (bandwidth utilization level) of an output port (page 3 lines 14-page 4 line 2).

Lyon discloses a traffic flow controller (element 100 in fig 1) coupled to the input and output ports, where the traffic controller receives discard information from the output port, and formulates a traffic control message which is sent to the input port (page 2 lines 8-31 and see fig 1 and 2).

Claim 47 Lyon discloses determining discarding information dependant on the results of the comparison, and if the threshold is exceeded for a particular queue, sending a flow control message for discarding (page 38 lines 9-17 and page 4 lines 3-13).

Lyon discloses determining discarding information dependant on the results of the comparison, and if the threshold is not exceeded, forwarding the packets accordingly (page 38 lines 9-17 and page 4 lines 3-13).

Art Unit: 2616

Claim 48 Lyon discloses storing packets in an input queue, where a scheduler controls the flow of packets from the queues dependant upon received control flow messages, where the messages are formed as a result of the congestion level (page 10 line 26-page 11 line 18 and see page 10 lines 13-21).

Claim 49 Lyon discloses a discarder within the forwarder for sending packets on an alternate route for discard in the event that a flow control message indicates that packets are in condition for discard (page 10 lines 7-25).

Claim 51 Lyon discloses if a packet is in condition for discarding setting a specific bit to 1 (page 20 line 26- page 21 line 31).

Claim 57 Lyon discloses an output port connected to an output buffer, where the output buffer contains a number of output queues (element 30 in fig 3).

Lyon discloses an accumulator for maintaining a count of the level of congestion in an output port (page 3 line 14-page 4 line 2).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4, 25-37, 40-45 and 53-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lyon (CA 2292828) in view of Blumer et al. (US

2002/0105908)

Art Unit: 2616

Claim 1, 37, 44 Lyon discloses a method for traffic flow control, where information is obtained pertaining to the congestion level (bandwidth utilization level) of an output port (page 3 lines 14-page 4 line 2), where each output port is associated with an output buffer (egress queue) as seen in fig 1 elements 16 a-n and elements 1-N.

Lyon discloses a traffic flow controller (element 100 in fig 1) coupled to the input and output ports, where the traffic controller receives discard information from the output port, and formulates a traffic control message which is sent to the input port (page 2 lines 8-31 and see fig 1 and 2).

Lyon also discloses sending priority information to the controller (Col 2 lines 26-31).

Lyon does not specifically disclose determining from the bandwidth utilization information, a discard probability associated with each egress queue.

Blumer et al. ('Blumer' hereinafter) discloses a determining mechanism connected to a buffer, for determining a drop probability for a buffer (paragraph 0013 and 0023), using a number of variables (bandwidth utilization information), including packet size and buffer fill (paragraph 0029).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to combine the output buffers as disclosed by Lyon, to include the apparatus for determining a drop probability as disclosed by Blumer. The motivation for this modification is to manage buffer occupancy and use that information to control congestion within a switching device.

Claim 2 Lyon discloses a cell tap (traffic management entity) for monitoring and transmitting bandwidth priorities (bandwidth utilization information) about an output port (page 3 lines 7-13 and see element 26 in fig 3), where each output port is associated with an output buffer as can be seen in fig 1.

Claim 3 Lyon discloses each packet being made up of a plurality of traffic bytes or a plurality of non-traffic bytes (priorities of cells-see page 8 lines 24-33)

Lyon does not disclose obtaining bandwidth utilization information regarding packets received at the egress queues further includes determining for each particular one of the output ports, an average number of traffic bytes received per time unit for each egress queue connected to the particular output port.

Blumer discloses a mechanism for determining an average buffer fill, which is an average fill state of a buffer (page 2 paragraph 0022), and is calculated on a periodic basis (paragraph 0033).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to combine the output buffers as disclosed by Lyon, to include the apparatus for determining a drop probability as disclosed by Blumer. The motivation for this modification is to manage buffer occupancy and use that information to control congestion within a switching device.

Claim 4 Lyon discloses information being obtained pertaining to the congestion level (allocated bandwidth) of an output port (page 3 lines 14-page 4 line 2), where each output port is associated with an output buffer (egress queue) as seen in fig 1 elements 16 a-n and elements 1-N.

Lyon discloses comparing the count (allocated traffic bandwidth) of each output queue to a bandwidth threshold (average received traffic bytes) for an output queue (page 38 lines 9-17 and page 3 lines 14-page 4 line 2).

Lyon discloses determining discarding information dependant on the results of the comparison, and if the threshold is exceeded for a particular queue, sending a flow control message for discarding (page 38 lines 9-17 and page 4 lines 3-13).

Lyon discloses determining discarding information dependant on the results of the comparison, and if the threshold is not exceeded, forwarding the packets accordingly

Lyon does not specifically disclose increasing or decreasing the discard probability. However, Blumer discloses determining a drop probability dependant on comparing an average buffer fill to a threshold (paragraph 0032).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to combine the comparison of a count of the level of congestion in a particular queue to a threshold as disclosed by Lyon, with determining a drop probability based on a comparison procedure as disclosed by Blumer. The motivation for this combination is to ensure buffer management through evaluating a buffer occupancy, and performing discarding of packets in the event of congestion. Furthermore, it would have been obvious to one of the ordinary skill in the art at the time of the invention that when the threshold is exceeded as disclosed by Lyon, that discarding increases the chances of discarding, and when the threshold is not exceeded, there is less of a chance of discarding.

Claim 25 Lyon discloses a plurality of output ports (elements 1-N in fig 1). Lyon also discloses each o the plurality of output ports being connected to a respective one of the output buffers (see fig 1 elements 1-N and see fig 3).

Claim 26 Lyon discloses an output port connected to an output buffer, where the output buffer contains a number of output queues (element 30 in fig 3).

Claim 27 The rejection of claim 1 discloses providing discard probability information. Lyon discloses a controller with a processor with a program memory (elements 152 and 154 in fig 9), where a controller is implemented using software programs and variables stored in the memory (page 16 lines 13-21). It would have been obvious to one of the ordinary skill in the art at the time of the invention that any program could be implemented to provide the discard probability.

Claim 28 Lyon discloses a traffic flow controller (element 100 in fig 1) receiving discard information from the output port (page 2 lines 8-31 and see fig 1 and 2). Lyon also discloses the controller only sending flow control messages for discarding packets at the input ports when discarding is necessary (page 3 lines 14-page 4 line 2).

Lyon does not specifically disclose recording the discard probability associated with each egress queue at selected times, and detecting whether a change of at least a predetermined magnitude has occurred in the discard probability associated with the egress queue.

Blumer discloses an average buffer fill value being used to calculate the drop probability, where the average buffer fill value may be calculated on a periodic basis (paragraph 0033)

Blumer discloses comparing the calculated drop probability associated with a buffer to a number (predetermined magnitude) generated by a linear feedback shift register (paragraph 0028).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the controller and buffers as disclosed by Lyon, to receive and transmit respectively, drop probability information when a comparison to a random number has proven to be exceeded within the buffer as disclosed by Blumer. The motivation for this modification is to limit the amount of information being sent to the controller, thus limiting unnecessary congestion.

Claim 29 Lyon discloses a traffic flow controller (element 100 in fig 1) receiving discard information from the output port (page 2 lines 8-31 and see fig 1 and 2). Lyon also discloses the controller only sending flow control messages for discarding packets at the input ports when discarding is necessary (page 3 lines 14-page 4 line 2).

Lyon does not specifically disclose recording the discard probability associated with each egress queue at selected times, and detecting whether a change of at least a predetermined magnitude has occurred in the discard probability associated with the egress queue. Lyon also does not disclose providing discard probability after a predetermined amount of time.

Blumer discloses an average buffer fill value being used to calculate the drop probability, where the average buffer fill value may be calculated on a periodic basis (paragraph 0033)

Blumer discloses comparing the calculated drop probability associated with a buffer to a number (predetermined magnitude) generated by a linear feedback shift register (paragraph 0028).

Blumer discloses a decision being made every 2 cycles (paragraph 0052), where a decision is based on whether the discard probability is greater than the number generated.

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the controller and buffers as disclosed by Lyon, to receive and transmit respectively, drop probability information when a comparison to a random number has proven to be exceeded within the buffer as disclosed by Blumer. It would have also been obvious to one of the ordinary skill in the art at the time of the invention that the time taken for a decision to be made as disclosed by Blumer could be a predetermined time, where 2 cycles could be the minimum amount of time before further processing. The motivation for this modification is to limit the amount of information being sent to the controller, thus limiting unnecessary congestion.

Claim 30 Lyon discloses a controller discarding or not discarding a packet associated with a particular output port depending on whether or not a threshold is exceeded (page 3 line 14- page 4 line 2).

Lyon does not specifically disclose determining an egress queue for which a packet is destined and transmitting or not transmitting based on the discard probability.

Blumer discloses determining to which queue a packet belongs by obtaining a packet identifier (paragraph 0052).

Blumer also discloses discarding the packets based on a drop probability (paragraph 0022 and 0013).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to use identifiers as disclosed by Blumer within the packets to distinguish between packets destined output ports, where a controller as disclosed by Lyon could be used to perform the distinguishing. The motivation for this modification is to identify packets destination.

Claim 31, 32, 54, 55 Lyon does not disclose generating a random number for the received packet; comparing the random number to the discard probability associated with the egress queue for which the received packet is destined, and transmitting or not transmitting based on the comparison.

Blumer discloses generating a random number, comparing a drop probability to the random number and discarding (claim 32) the packet if the drop probability is greater than the random number (paragraph 0026).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the output buffers as disclosed by Lyon, to include the apparatus for calculating comparing and discarding as disclosed by Blumer. The motivation for this modification is to achieve buffer management and avoid congestion.

Claim 33 Lyon discloses if a packet is in condition for discarding setting a specific bit to 1 (page 20 line 26- page 21 line 9).

Claim 34 Lyon discloses storing/queuing cells within an output buffer/queue (page 4 lines 3-13).

Lyon discloses if a packet is in condition for discarding setting a specific bit to 1 (page 20 line 26- page 21 line 9).

Lyon discloses a discarder for discarding and otherwise, forwarding cells (page 2 lines 32-page 3 line 5).

Claim 35 Lyon discloses an accumulator for determining a level of congestion in an output port, where each output port is coupled to an output buffer (page 3 line 14- page 4 line 2).

Lyon discloses an updating procedure, where a count of the congestion level of an output port is updated. Lyon also discloses if a threshold is not exceeded, not discarding the packets.

Lyon discloses setting a bit to 0 if a packet is not to be discarded (page 20 line 26- page 21 line 9).

It would have been obvious to one of the ordinary skill in the art at the time of the invention that the packet previously marked a discardable, could remain in an output queue for some time, and therefore be treated as a regular packet in the updating procedure seeing that the conditions above are met.

Claim 36 Lyon discloses the controller being implemented using a software program (page 16 lines 13-21).

Claim 40 Lyon discloses a method for traffic flow control, where information is obtained on a switch fabric pertaining to the congestion level (bandwidth utilization level) of an output port (page 3 lines 14-page 4 line 2), where each output port is

associated with an output buffer (egress queue) as seen in fig 1 elements 16 a-n and elements 1-N.

Lyon discloses a controller for determining discarding information (page 38 lines 9-17 and page 4 lines 3-13).

Lyon discloses a cell forwarder for receiving data destined for the output, and identifying the destination output port and queue (page 9 line 25- page 10 line 6).

Lyon discloses determining discarding information dependant on the results of the comparison, and if the threshold is exceeded for a particular queue, sending a flow control message for discarding (page 38 lines 9-17 and page 4 lines 3-13).

Lyon discloses determining discarding information dependant on the results of the comparison, and if the threshold is not exceeded, forwarding the packets accordingly (page 38 lines 9-17 and page 4 lines 3-13).

Lyon does not specifically disclose a drop probability evaluation module connected to the egress queues, said drop probability evaluation entity being adapted to determine a discard probability associated with each of the egress queues on the basis of the bandwidth utilization information.

Blumer et al. ('Blumer' hereinafter) discloses a determining mechanism connected to a buffer, for determining a drop probability for a buffer (paragraph 0013 and 0023), using a number of variables (bandwidth utilization information), including packet size and buffer fill (paragraph 0029).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the controller which is connected to both output and input ports as

Art Unit: 2616

disclosed by Lyon, to perform the mechanism of calculating the drop probability in order to determine whether or not discarding of packets is necessary (abstract).

Claim 41 Lyon discloses each output port is associated with an output buffer (egress queue) as seen in fig 1 elements 16 a-n and elements 1-N.

Lyon discloses a traffic flow controller which receives output port messages (page 7 line 35-page 8 line23), where it would have been obvious to one of the ordinary skill in the art at the time of the invention that the controller is connected to a plurality of output ports, where a plurality of ports may be divided into groups and connected to the controller via a line card within the controller, which transmits and receives data.

Lyon does not specifically disclose a portion of the drop probability evaluation module is provided one each of the output line cards.

Blumer et al. ('Blumer' hereinafter) discloses a determining mechanism connected to a buffer, for determining a drop probability for a buffer (paragraph 0013 and 0023).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the traffic flow controller as disclosed by Lyon, to calculate the drop probability as disclosed by Blumer, where line cards receive and transmit messages to output and input ports. The method for this modification is to ultimately determine whether or not discarding of packets is necessary (abstract).

Claim 42 Lyon discloses a traffic flow controller connected to a plurality of input ports (fig 1), where it would have been obvious to one of the ordinary skill in the art at the time of the invention to implement a line card to enhance the connection.

Lyon discloses the forwarder being connected to the traffic flow controller for receiving input port messages (page 9 line 25- page 10 line 6).

Claim 43 Lyon discloses a switch fabric (page 2 lines 5-25).

Claim 45 Lyon discloses a cell forwarder for receiving data destined for the output, and identifying the destination output port and queue (page 9 line 25- page 10 line 6).

Lyon discloses the controller receiving and determining priorities (page 7 line 35- page 8 line 22).

Lyon discloses determining discarding information dependant on the results of the comparison, and if the threshold is exceeded for a particular queue, sending a flow control message for discarding (page 38 lines 9-17 and page 4 lines 3-13).

Lyon discloses determining discarding information dependant on the results of the comparison, and if the threshold is not exceeded, forwarding the packets accordingly (page 38 lines 9-17 and page 4 lines 3-13).

3. Claims 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lyon (CA 2292828) in view of Haskin et al. (US 6813242)

Claim 50 Lyon does not specifically disclose not transmitting the received packet packet to the ingress entity includes rerouting the packet along the alternate route.

Haskin discloses rerouting the packet along the alternate route from an ingress to an egress in the event of congestion (Col 2 lines 28-50).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to combine the method of rerouting a packet from an ingress to an egress as

Art Unit: 2616

disclosed by Haskin in the event of congestion as indicated by a flow control message as disclosed by Lyon. The motivation for this combination is to avoid congestion.

4. Claims 58 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lyon (CA 2292828) in view of Jefferies et al. (US 6728253)

Claim 58 Lyon discloses an output port connected to an output buffer, where the output buffer contains a number of output queues (element 30 in fig 3).

Lyon does not specifically disclose the congestion information including variability in the occupancy of each of the egress queues.

Jefferies discloses determining a variable occupancy value of each a plurality of queues (Col 2 lines 25-44), and furthermore using this information to allocate data bandwidth from a source.

It would have been obvious to one of the ordinary skill in the art at the time of the invention to implement the scheduler as disclosed by Jefferies, within the controller as disclosed by Lyon. The motivation for this modification is to allow the flow control messages as disclosed by Lyon to adjust a bandwidth given that the queue occupancy has been evaluated, and it has been determined that a certain level of congestion has been reached.

Allowable Subject Matter

4. Claims 5-24, 38 and 39 are allowed.

Response to Arguments

5. Applicant's arguments filed on December 27, 2005 have been fully considered but they are not persuasive.

(a) The applicant argued that the cited art does not disclose the applicant claimed, "said congestion information including information associated with the amount of bandwidth consumed by packets arriving at the egress entity."

The examiner asserts that the argued limitation is disclosed within the rejection of claims 1, 37, 40 and 46, wherein Lyon discloses an indication of the amount of cells stored at an output queue and determining if a threshold level is reached (page 12 lines 1-25).

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher P. Grey whose telephone number is (571)272-3160. The examiner can normally be reached on 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chau Nguyen can be reached on (571)272-3126. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2616

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Christopher Grey
Examiner
Art Unit 2616

CL
6/9/06

Chau T. Nguyen

CHAU NGUYEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600